

Periodic Bathymetry Survey, Fall 2011 Post Hurricane Irene Survey Report
Response to EPA Comments

No.	Section/ Worksheet No.	Comment	Response
1	<i>GBA Multi-beam Report</i> , Section 2.0 Survey Setup and Control	Please provide the measured and reported control point coordinates from the day(s) on which control point surveying was completed (day before patch/performance test)?	The results are provided on page 2 of Attachment 1. No edits were made to the report.
2	<i>GBA Multi-beam Report</i> , Section 4.0 Data Processing and Collection	Please described the automatic filters that were applied to the sounding data during processing?	The filters applied to the multibeam echosounder data included: 1) the minimum/maximum depth (to eliminate soundings above and below), which varied with each survey pass based on the location in the channel and the depth of that location; 2) beam angle which excluded beams 45 degrees from nadir; and 3) quality flags – each sounding is given a quality flag of 1 to 3 with 3 being the highest quality; all soundings below quality level 3 were removed. Edits were made to the report to include the types of filters.
3	<i>GBA Multi-beam Report</i> , Section 5.0 QA/QC, Performance Tests	Please provide the text file results (e.g. anglestest.txt) from the performance tests.	The text file results are included as Attachment 2 to this response. Since they are raw data/output, they are not included in this report. Therefore, no edits were made to the report.
4	<i>GBA Multi-beam Report</i> , Section 5.0 QA/QC, Performance Tests	Where were the performance test surfaces collected? Is this the same as all previous surveys? If not, why was the location changed?	The patch and performance testing was moved to the Upper Newark Bay in 2011 within the confluence of the Passaic and Hackensack Rivers and immediately north of the railway bridge. Prior patch and performance tests had been conducted in the Lower Newark Bay, but ongoing maintenance and new dredging work in the Lower Newark Bay affected the area. Edits were made to the report to include this information.
5	<i>GBA Multi-beam Report</i> , Section 5.0 QA/QC, Performance Tests	At what location was the 2011 patch/performance testing completed – lower Newark Bay? Upper NB? Was this the same as previous years?	See reply to Comment #4.
6	<i>GBA Multi-beam Report</i> , Attachment 1, Appendix 4	Please clarify what the daily boat positioning measurements refer to on the daily report summary sheet (page 1 of each day's notes). Is it simply a blunder check when the boat is tied up at the dock?	Yes, the daily boat positioning is a blunder check, but was conducted at various locations which depended on the survey location for that day. At the beginning and end of each survey day, the survey vessel was placed in a held location and maintained as close as possible to that position to ensure there were no significant deltas in the positioning (> 1 ft). The held locations were the same at the beginning and end of each survey day, but varied based on the survey location for that day. The predominance of error encountered was the limitation of physically locating floating plant in one repeatable position. No edits were made to the report.

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7	<i>GBA Multi-beam Report</i> , Attachment 1, Appendix 4	<p>Was the same reference surface used for beginning, mid and end performance tests? Or was a new reference surface created each time a performance test was completed? The same reference surface should be used for each performance test.</p> <p>a. Appears that a new reference surface was measured on 11/5/2011</p> <ul style="list-style-type: none"> i. 20 reference lines were driven on 10/5/2011 (GBA notes, Attachment 4) ii. 23 reference lines were driven on 10/23/2011 (during re-calibration) iii. 35 reference lines were driven on 11/5/2011 iv. 21 reference lines were driven on 11/10/2011. 	<p>No, the reference surfaces were different but were all collected in the same location in Upper Newark Bay. As per the prior surveys of the Lower Passaic River, the same reference surface was used during a given patch and performance test, but varied between patch and performance tests performed during the survey. This practice has been conducted consistently since the 2008 Lower Passaic River survey. The text was edited to provide clarification.</p> <p>The reference area for each performance test contained the same number of target lines (10 lines). However during the data collection for the reference surface, artifacts were created by boat wake, or loss of the RTK corrections due to cellular dropout. When that occurred, the lines were re-run to be used in the test analyses. The number of lines referred to in the comment includes those that were rerun.</p> <p>The text in the previous paragraph regarding the number of target lines for each reference area was added to Section 5.0 under "Performance Tests."</p>
8	<i>GBA Multi-beam Report</i> , Section 5.0 QA/QC, Single Beam Cross-check Lines	Please quantify how the single-beam data compared to the multi-beam data in overlap areas? It is difficult to quantify from the plot(s).	Throughout the course of the survey, single beam check lines were compared to the 3 ft x 3 ft binned multibeam soundings. On flat bottoms, the delta between single beam and multibeam were \pm 0.2 ft. On sloped bottoms, i.e., along the shoreline, the observed deltas were more variable due to the artifact of averaging a slope within 3 ft x 3 ft bin vs. discreet points obtained with single beam. Due to the volume of multibeam data collected (millions of soundings), a comparison of non-binned multibeam to single beam data has not been performed. This data has been archived. No edits were made to the report.
9	<i>GBA Multi-beam Report</i> , no section specified in Comments	Please provide the numerical results of the bar checks for single-beam and multi-beam (measured vs. known).	Single beam bar checks were conducted to ensure that check values matched the known values. These results are provided on the daily log sheets in Appendix 4 of the report. No edits were made to the report.
10	<i>GBA Multi-beam Report</i> , Attachment 1, Appendices 2c and 3	It is unclear which direction the transects are being shown (e.g. facing upstream/downstream, right bank to left bank?). And, can this be noted in the drawings?	Single beam cross-sections are plotted facing upstream, i.e., Newark is on the left and Kearny is on the right. A note has been added to each drawing to this effect.

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11	<i>GBA Multi-beam Report</i> , no section specified in Comments	Were any data from beam angles larger than 45 degrees used in the final dataset at any point in the river as done in the past?	No, during final data processing, only multibeam soundings within 45 degrees of nadir were included for final deliverables. This information was clarified in the report.

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ATTACHMENT 1 - MEASURED AND REPORTED CONTROL POINT COORDINATES

Lower Passaic River 2011 Control - Check-IN

Control Point Designation:	01392590 A NGS PID:	AI7796
Published NJSP NAD 83 Horizontal Coordinates (ft):	Pub. Elevation NGVD29 (ft):	12.78
Northing: 692,097.66 Easting: 588,059.00	Pub. Elevation NAVD88 (ft):	11.67
Check-In positions (NAD 83/NAVD88)	Errors:	
ID Northing Easting Elevation	Northing Easting Elevation	
AI7796001 692097.71 588059.06 11.68	-0.04 -0.06 -0.01	
AI7796002 692097.71 588059.04 11.66	-0.05 -0.04 0.01	
AI7796003 692097.73 588059.03 11.68	-0.07 -0.03 -0.01	
Control Point Designation: CPG NGS PID:	N/A: Local control	
Published NJSP NAD 83 Horizontal Coordinates (ft):	Obs. Elevation NGVD29 (ft):	9.19
Northing: N/A Easting: N/A	Obs. Elevation NAVD88 (ft):	8.18
Check-In positions (NAD 83/NAVD88)	Errors:	
ID Northing Easting Elevation	Northing Easting Elevation	
CPG1CHK1 733759.04 597078.74 8.20	N/A N/A -0.02	
CPG1CHK2 733758.99 597078.74 8.21	N/A N/A -0.03	
CPG1CHK3 733758.97 597078.73 8.21	N/A N/A -0.03	
Control Point Designation: CPG 2 NGS PID:	N/A: Local control	
Published NJSP NAD 83 Horizontal Coordinates (ft):	Obs. Elevation NGVD29 (ft):	8.95
Northing: N/A Easting: N/A	Obs. Elevation NAVD88 (ft):	7.936
Check-In positions (NAD 83/NAVD88)	Errors:	
ID Northing Easting Elevation	Northing Easting Elevation	
CPG2CHK1 733825.57 597109.30 7.99	N/A N/A -0.06	
CPG2CHK2 733825.57 597109.29 8.01	N/A N/A -0.07	
CPG2CHK3 733825.59 597109.29 8.02	N/A N/A -0.08	
Control Point Designation: G101 NGS PID:	KV3414	
Published NJSP NAD 83 Horizontal Coordinates (ft):	Pub. Elevation NGVD29 (ft):	15.29
Northing: 715,490.26 Easting: 592,312.82	Pub. Elevation NAVD88 (ft):	14.24
Check-In positions (NAD 83/NAVD88)	Errors:	
ID Northing Easting Elevation	Northing Easting Elevation	
G101CHK1 715490.42 592312.82 14.24	-0.16 0.00 0.00	
G101CHK2 715490.44 592312.82 14.28	-0.18 0.00 -0.04	
G101CHK3 715490.43 592312.82 14.29	-0.17 0.00 -0.05	
Control Point Designation: PORT 1 NGS PID:	N/A	
Observed NJSP NAD 83 Horizontal Coordinates (ft):	Obs. Elevation NGVD29 (ft):	10.01
Northing: N/A Easting: N/A	Obs. Elevation NAVD88 (ft):	8.89
Check-In positions (NAD 83/NAVD88)	Errors:	
ID Northing Easting Elevation	Northing Easting Elevation	
PORTCHK1 695188.36 597847.55 8.94	N/A N/A -0.04	
PORTCHK2 695188.37 597847.55 8.92	N/A N/A -0.02	
PORTCHK3 695188.35 597847.56 8.93	N/A N/A -0.04	

Lower Passaic River 2012 Control - Check-IN

Control Point Designation:	NUTLEY 2	NGS PID:	N/A: Local control		
Published NJSP NAD 83 Horizontal Coordinates (ft):			Obs. Elevation NGVD29 (ft): 8.992		
Northing: N/A	Easting: N/A		Obs. Elevation NAVD88 (ft): 7.952		
			Check-In positions (NAD 83/NAVD88)		
	ID	Northing	Easting	Elevation	Errors:
	NUT2CHK1	720714.61	592028.65	7.89	Northing Easting Elevation
	NUT2CHK2	720714.62	592028.65	7.88	N/A N/A 0.06
	NUT2CHK3	720714.62	592028.64	7.88	N/A N/A 0.08
					N/A N/A 0.08
Control Point Designation:	NUTLEY	NGS PID:	N/A: Local control		
Published NJSP NAD 83 Horizontal Coordinates (ft):			Obs. Elevation NGVD29 (ft): 9.6		
Northing: N/A	Easting: N/A		Obs. Elevation NAVD88 (ft): 8.54		
			Check-In positions (NAD 83/NAVD88)		
	ID	Northing	Easting	Elevation	Errors:
	NUT1CHK1	720744.65	592033.51	8.50	Northing Easting Elevation
	NUT1CHK2	720744.65	592033.52	8.48	N/A N/A 0.04
	NUT1CHK3	720744.66	592033.51	8.49	N/A N/A 0.06
					N/A N/A 0.05
Control Point Designation:	PSE & G Disk	NGS PID:	N/A, Locally "PATH"		
Observed NJSP NAD 83 Horizontal Coordinates (ft):			Obs. Elevation NGVD29 (ft): 6.791		
Northing: 701,846.00	Easting: 585,643.04		Obs. Elevation NAVD88 (ft): 5.705		
			Check-In positions (NAD 83/NAVD88)		
	ID	Northing	Easting	Elevation	Errors:
	PATH1CHK1	701845.97	585642.99	5.71	Northing Easting Elevation
	PATH1CHK2	701845.96	585643.00	5.70	0.04 0.05 0.00
	PATH1CHK3	701845.97	585643.00	5.70	0.04 0.04 0.00
					0.04 0.04 0.00
Control Point Designation:	PATH 3	NGS PID:	N/A		
Observed NJSP NAD 83 Horizontal Coordinates (ft):			Obs. Elevation NGVD29 (ft): 7.191		
Northing: N/A	Easting: N/A		Obs. Elevation NAVD88 (ft): 6.105		
			Check-In positions (NAD 83/NAVD88)		
	ID	Northing	Easting	Elevation	Errors:
	PATH3CHK1	702169.39	585787.85	6.12	Northing Easting Elevation
	PATH3CHK2	702169.39	585787.85	6.12	N/A N/A -0.01
	PATH3CHK3	702169.39	585787.85	6.12	N/A N/A -0.01
					N/A N/A -0.02

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ATTACHMENT 2 – TXT FILES

Notes:

1. Data with an asterisk were not used for analysis.
2. The dates of the test are provided at the top of each page, e.g., "Angtest_100511.txt" represents the test conducted on October 5, 2011.

Angtest_100511.txt							
+/-	Beam	Angle	Limit	Max	Outlier	Mean	Diff
	20			1.25		-0.03	0.16
	25			1.25		-0.02	0.13
	30			1.15		-0.04	0.13
	35			1.18		-0.07	0.12
	40			1.18		-0.09	0.12
	45			1.82		-0.11	0.12
	50			1.82		-0.19	0.11
	55			1.82		-0.24	0.15
	60			1.58		-0.29	0.13
	65			0.00		0.00	0.00
	70			0.00		0.00	0.00
	75			0.00		0.00	0.00
Beam	Angle	Samples	Max	Outlier	Mean	Diff	
1	0	0	0.00		0.00		
2	0	0	0.00		0.00		
3	0	0	0.00		0.00		
4	0	0	0.00		0.00		
5	0	0	0.00		0.00		
6	0	0	0.00		0.00		
7	0	0	0.00		0.00		
8	0	0	0.00		0.00		
9	0	0	0.00		0.00		
10	0	0	0.00		0.00		
11	0	0	0.00		0.00		
12	0	0	0.00		0.00		
13	0	0	0.00		0.00		
14	0	0	0.00		0.00		
15	0	0	0.00		0.00		
16	0	0	0.00		0.00		
17	0	0	0.00		0.00		
18	0	0	0.00		0.00		
19	0	0	0.00		0.00		
20	0	0	0.00		0.00		
21	0	0	0.00		0.00		
22	0	0	0.00		0.00		
23	0	0	0.00		0.00		
24	0	0	0.00		0.00		
25	0	0	0.00		0.00		
26	0	0	0.00		0.00		
27	0	0	0.00		0.00		
28	59	30	0.46		0.21		***
29	58	41	0.47		0.17		**
30	58	44	0.76		0.22		***
31	57	47	0.76		0.19		**
32	56	49	1.00		0.18		**
33	55	50	0.77		0.17		**
34	54	44	0.92		0.17		**
35	53	50	0.75		0.19		**
36	51	42	1.05		0.19		**
37	49	45	1.02		0.17		**
38	48	50	0.68		0.15		**
39	46	50	0.86		0.13		**
40	45	44	0.60		0.12		**
41	44	50	1.02		0.12		**
42	43	40	0.75		0.12		**
43	41	44	0.59		0.11		**
44	39	41	0.63		0.12		**
45	38	50	0.59		0.10		*
46	36	47	0.71		0.10		*
47	34	50	0.78		0.10		**
48	33	50	0.75		0.09		*

Angtest_100511.txt					
49	32	50	1. 06	0. 08	*
50	30	46	0. 80	0. 09	*
51	28	47	0. 87	0. 08	*
52	28	45	0. 86	0. 09	*
53	25	50	0. 76	0. 07	*
54	24	50	0. 98	0. 07	*
55	22	44	1. 09	0. 12	**
56	22	39	1. 16	0. 09	*
57	20	50	1. 25	0. 12	**
58	18	50	1. 02	0. 09	*
59	16	50	0. 90	0. 11	**
60	16	50	0. 57	0. 09	*
61	14	50	0. 49	0. 11	**
62	12	50	0. 49	0. 09	*
63	11	50	0. 92	0. 10	**
64	9	46	1. 35	0. 12	**
65	8	36	1. 18	0. 12	**
66	6	44	1. 10	0. 10	*
67	4	50	0. 90	0. 08	*
68	3	42	0. 60	0. 08	*
69	2	50	0. 50	0. 08	*
70	-1	40	0. 43	0. 10	*
71	-1	50	0. 43	0. 08	*
72	-3	45	0. 41	0. 07	*
73	-5	50	0. 72	0. 08	*
74	-6	48	0. 74	0. 07	*
75	-7	50	0. 74	0. 10	*
76	-9	46	0. 53	0. 07	*
77	-10	40	0. 49	0. 07	*
78	-12	44	0. 45	0. 10	*
79	-13	39	0. 45	0. 09	*
80	-15	48	0. 44	0. 10	**
81	-17	42	0. 59	0. 09	*
82	-18	50	1. 03	0. 08	*
83	-19	50	0. 99	0. 10	**
84	-21	47	0. 80	0. 09	*
85	-22	50	0. 72	0. 10	**
86	-24	50	1. 15	0. 12	**
87	-25	42	1. 02	0. 11	**
88	-27	46	0. 83	0. 12	**
89	-29	50	0. 78	0. 12	**
90	-30	50	0. 80	0. 09	*
91	-31	50	0. 80	0. 08	*
92	-33	46	0. 60	0. 10	*
93	-35	50	0. 69	0. 11	**
94	-36	41	1. 18	0. 12	**
95	-37	46	0. 68	0. 12	**
96	-39	28	0. 74	0. 14	**
97	-41	39	0. 72	0. 12	**
98	-41	39	0. 89	0. 14	**
99	-44	50	0. 79	0. 16	**
100	-45	50	0. 66	0. 15	**
101	-46	50	1. 51	0. 15	**
102	-48	48	1. 25	0. 19	**
103	-50	50	1. 82	0. 26	***
104	-51	50	1. 25	0. 20	***
105	-52	46	0. 76	0. 25	***
106	-54	47	0. 79	0. 27	***
107	-55	49	1. 20	0. 31	****
108	-57	50	1. 58	0. 31	****
109	-58	50	1. 34	0. 36	****
110	-59	48	0. 77	0. 32	****
111	-59	50	1. 10	0. 35	****

Angtest_100511.txt

112	-60	50	0. 95	0. 32	****
113	-61	50	0. 53	0. 30	****
114	0	0	0. 00	0. 00	
115	0	0	0. 00	0. 00	
116	0	0	0. 00	0. 00	
117	0	0	0. 00	0. 00	
118	0	0	0. 00	0. 00	
119	0	0	0. 00	0. 00	
120	0	0	0. 00	0. 00	
121	0	0	0. 00	0. 00	
122	0	0	0. 00	0. 00	
123	0	0	0. 00	0. 00	
124	0	0	0. 00	0. 00	
125	0	0	0. 00	0. 00	
126	0	0	0. 00	0. 00	
127	0	0	0. 00	0. 00	
128	0	0	0. 00	0. 00	
129	0	0	0. 00	0. 00	
130	0	0	0. 00	0. 00	
131	0	0	0. 00	0. 00	
132	0	0	0. 00	0. 00	
133	0	0	0. 00	0. 00	
134	0	0	0. 00	0. 00	
135	0	0	0. 00	0. 00	
136	0	0	0. 00	0. 00	
137	0	0	0. 00	0. 00	
138	0	0	0. 00	0. 00	
139	0	0	0. 00	0. 00	
140	0	0	0. 00	0. 00	
141	0	0	0. 00	0. 00	

Angtest_102311.txt							
+/-	Beam	Angle	Limit	Max	Outlier	Mean	Diff
	20			0.86		0.04	0.08
	25			0.36		0.01	0.07
	30			0.60		0.00	0.08
	35			0.60		-0.01	0.06
	40			0.30		-0.01	0.06
	45			0.30		-0.03	0.05
	50			0.00		0.00	0.00
	55			0.00		0.00	0.00
	60			0.00		0.00	0.00
	65			0.00		0.00	0.00
	70			0.00		0.00	0.00
	75			0.00		0.00	0.00
Beam	Angle	Samples	Max	Outlier	Mean	Diff	
1	0	0	0.00		0.00		
2	0	0	0.00		0.00		
3	0	0	0.00		0.00		
4	0	0	0.00		0.00		
5	0	0	0.00		0.00		
6	0	0	0.00		0.00		
7	0	0	0.00		0.00		
8	0	0	0.00		0.00		
9	0	0	0.00		0.00		
10	0	0	0.00		0.00		
11	0	0	0.00		0.00		
12	0	0	0.00		0.00		
13	0	0	0.00		0.00		
14	0	0	0.00		0.00		
15	0	0	0.00		0.00		
16	0	0	0.00		0.00		
17	0	0	0.00		0.00		
18	0	0	0.00		0.00		
19	0	0	0.00		0.00		
20	0	0	0.00		0.00		
21	0	0	0.00		0.00		
22	0	0	0.00		0.00		
23	0	0	0.00		0.00		
24	0	0	0.00		0.00		
25	0	0	0.00		0.00		
26	0	0	0.00		0.00		
27	0	0	0.00		0.00		
28	0	0	0.00		0.00		
29	0	0	0.00		0.00		
30	0	0	0.00		0.00		
31	0	0	0.00		0.00		
32	0	0	0.00		0.00		
33	0	0	0.00		0.00		
34	0	0	0.00		0.00		
35	0	0	0.00		0.00		
36	0	0	0.00		0.00		
37	0	0	0.00		0.00		
38	44	42	0.15		0.05	*	
39	44	41	0.30		0.04	*	
40	43	50	0.23		0.04	*	
41	42	41	0.19		0.04	*	
42	42	48	0.23		0.05	*	
43	39	50	0.20		0.04	*	
44	38	46	0.17		0.04	*	
45	37	46	0.18		0.05	*	
46	35	50	0.29		0.05	*	
47	34	47	0.30		0.05	*	
48	32	50	0.43		0.04	*	

Angtest_102311.txt

49	31	50	0. 60	0. 06	*
50	29	47	0. 36	0. 05	*
51	28	49	0. 24	0. 05	*
52	26	49	0. 26	0. 05	*
53	25	50	0. 24	0. 06	*
54	23	50	0. 32	0. 06	*
55	21	42	0. 32	0. 05	*
56	21	47	0. 25	0. 07	*
57	19	50	0. 36	0. 08	*
58	17	45	0. 44	0. 06	*
59	16	50	0. 26	0. 07	*
60	14	50	0. 26	0. 08	*
61	12	50	0. 30	0. 08	*
62	11	50	0. 23	0. 06	*
63	10	50	0. 27	0. 07	*
64	8	47	0. 21	0. 07	*
65	7	44	0. 24	0. 06	*
66	5	44	0. 22	0. 06	*
67	4	38	0. 25	0. 08	*
68	3	50	0. 21	0. 07	*
69	1	50	0. 25	0. 08	*
70	-0	45	0. 23	0. 08	*
71	-2	47	0. 23	0. 08	*
72	-4	50	0. 23	0. 06	*
73	-5	50	0. 21	0. 06	*
74	-6	50	0. 32	0. 06	*
75	-8	50	0. 21	0. 06	*
76	-10	50	0. 32	0. 08	*
77	-11	50	0. 38	0. 06	*
78	-13	50	0. 33	0. 08	*
79	-13	44	0. 30	0. 06	*
80	-15	50	0. 39	0. 07	*
81	-17	48	0. 42	0. 07	*
82	-19	50	0. 86	0. 08	*
83	-20	46	0. 31	0. 06	*
84	-21	50	0. 28	0. 06	*
85	-23	44	0. 23	0. 05	*
86	-25	50	0. 26	0. 06	*
87	-26	50	0. 34	0. 05	*
88	-27	44	0. 24	0. 06	*
89	-29	50	0. 36	0. 05	*
90	-31	39	0. 22	0. 04	*
91	-32	48	0. 23	0. 05	*
92	-34	40	0. 32	0. 05	*
93	-35	50	0. 24	0. 04	*
94	-37	50	0. 26	0. 06	*
95	-39	49	0. 29	0. 06	*
96	-39	48	0. 21	0. 04	*
97	-41	40	0. 26	0. 05	*
98	-42	45	0. 18	0. 04	*
99	-43	47	0. 21	0. 06	*
100	-44	41	0. 13	0. 04	*
101	-44	42	0. 17	0. 04	*
102	0	0	0. 00	0. 00	
103	0	0	0. 00	0. 00	
104	0	0	0. 00	0. 00	
105	0	0	0. 00	0. 00	
106	0	0	0. 00	0. 00	
107	0	0	0. 00	0. 00	
108	0	0	0. 00	0. 00	
109	0	0	0. 00	0. 00	
110	0	0	0. 00	0. 00	
111	0	0	0. 00	0. 00	

Angtest_102311.txt

112	0	0	0.00	0.00
113	0	0	0.00	0.00
114	0	0	0.00	0.00
115	0	0	0.00	0.00
116	0	0	0.00	0.00
117	0	0	0.00	0.00
118	0	0	0.00	0.00
119	0	0	0.00	0.00
120	0	0	0.00	0.00
121	0	0	0.00	0.00
122	0	0	0.00	0.00
123	0	0	0.00	0.00
124	0	0	0.00	0.00
125	0	0	0.00	0.00
126	0	0	0.00	0.00
127	0	0	0.00	0.00
128	0	0	0.00	0.00
129	0	0	0.00	0.00
130	0	0	0.00	0.00
131	0	0	0.00	0.00
132	0	0	0.00	0.00
133	0	0	0.00	0.00
134	0	0	0.00	0.00
135	0	0	0.00	0.00
136	0	0	0.00	0.00
137	0	0	0.00	0.00
138	0	0	0.00	0.00
139	0	0	0.00	0.00
140	0	0	0.00	0.00
141	0	0	0.00	0.00

Angtest_110511.txt								
+/-	Beam	Angle	Limit	Max	Outlier	Mean	Diff	Std Dev
	20			0.50		0.00	0.08	0.15 **
	25			0.50		-0.00	0.07	0.14 **
	30			0.50		-0.01	0.07	0.13 **
	35			0.70		-0.02	0.09	0.17 **
	40			0.70		-0.02	0.08	0.15 **
	45			0.70		-0.03	0.09	0.18 **
	50			0.59		-0.04	0.08	0.16 **
	55			0.63		-0.06	0.13	0.26 ***
	60			0.50		-0.19	0.11	0.22 ***
	65			0.00		0.00	0.00	0.00
	70			0.00		0.00	0.00	0.00
	75			0.00		0.00	0.00	0.00

Beam	Angle	Samples	Max	Outlier	Mean	Diff
1	0	0	0.00		0.00	
2	0	0	0.00		0.00	
3	0	0	0.00		0.00	
4	0	0	0.00		0.00	
5	0	0	0.00		0.00	
6	0	0	0.00		0.00	
7	0	0	0.00		0.00	
8	0	0	0.00		0.00	
9	0	0	0.00		0.00	
10	0	0	0.00		0.00	
11	0	0	0.00		0.00	
12	0	0	0.00		0.00	
13	0	0	0.00		0.00	
14	0	0	0.00		0.00	
15	0	0	0.00		0.00	
16	0	0	0.00		0.00	
17	0	0	0.00		0.00	
18	0	0	0.00		0.00	
19	0	0	0.00		0.00	
20	0	0	0.00		0.00	
21	0	0	0.00		0.00	
22	0	0	0.00		0.00	
23	0	0	0.00		0.00	
24	0	0	0.00		0.00	
25	0	0	0.00		0.00	
26	0	0	0.00		0.00	
27	0	0	0.00		0.00	
28	0	0	0.00		0.00	
29	55	9	0.16		0.08 *	
30	56	41	0.63		0.09 *	
31	55	46	0.34		0.04 *	
32	54	50	0.23		0.06 *	
33	53	50	0.59		0.06 *	
34	52	46	0.42		0.04 *	
35	50	41	0.36		0.05 *	
36	49	50	0.24		0.05 *	
37	48	36	0.26		0.06 *	
38	46	48	0.29		0.05 *	
39	45	48	0.23		0.05 *	
40	43	50	0.42		0.04 *	
41	41	46	0.31		0.06 *	
42	40	50	0.40		0.06 *	
43	39	50	0.27		0.04 *	
44	37	45	0.30		0.04 *	
45	35	48	0.23		0.04 *	
46	34	46	0.41		0.04 *	
47	33	50	0.27		0.03 *	
48	31	49	0.20		0.04 *	

Angtest_110511.txt					
49	29	48	0.33	0.05	*
50	28	50	0.25	0.04	*
51	27	45	0.39	0.06	*
52	25	45	0.50	0.05	*
53	24	50	0.26	0.06	*
54	22	50	0.48	0.04	*
55	21	50	0.27	0.06	*
56	19	47	0.23	0.06	*
57	18	50	0.28	0.05	*
58	16	49	0.27	0.05	*
59	14	50	0.35	0.05	*
60	13	41	0.24	0.05	*
61	12	50	0.20	0.05	*
62	10	43	0.37	0.06	*
63	9	50	0.88	0.05	*
64	7	50	0.43	0.05	*
65	6	47	0.43	0.05	*
66	4	50	0.50	0.06	*
67	3	42	0.41	0.06	*
68	1	50	0.45	0.06	*
69	0	50	0.56	0.06	*
70	-2	47	0.26	0.07	*
71	-3	50	0.39	0.09	*
72	-5	50	0.30	0.06	*
73	-6	50	0.30	0.05	*
74	-8	50	0.36	0.06	*
75	-10	49	0.27	0.05	*
76	-11	41	0.20	0.05	*
77	-12	50	0.23	0.06	*
78	-14	50	0.27	0.06	*
79	-15	50	0.26	0.05	*
80	-17	50	0.24	0.05	*
81	-19	50	0.37	0.05	*
82	-20	45	0.26	0.05	*
83	-21	50	0.23	0.06	*
84	-23	42	0.32	0.05	*
85	-24	50	0.42	0.06	*
86	-26	50	0.36	0.06	*
87	-27	49	0.42	0.06	*
88	-29	41	0.25	0.07	*
89	-30	45	0.29	0.07	*
90	-32	50	0.31	0.07	*
91	-34	47	0.21	0.06	*
92	-35	50	0.41	0.06	*
93	-36	46	0.67	0.08	*
94	-38	47	0.55	0.08	*
95	-39	49	0.70	0.07	*
96	-41	50	0.26	0.07	*
97	-42	49	0.41	0.07	*
98	-43	49	0.51	0.08	*
99	-45	44	0.49	0.08	*
100	-47	50	0.35	0.08	*
101	-48	50	0.31	0.09	*
102	-50	44	0.48	0.10	**
103	-51	50	0.34	0.12	**
104	-53	38	0.38	0.13	**
105	-54	39	0.45	0.14	**
106	-55	50	0.46	0.17	**
107	-57	50	0.49	0.18	**
108	-58	50	0.50	0.20	***
109	-59	46	0.48	0.18	**
110	-60	48	0.48	0.18	**
111	-61	26	0.39	0.21	***

Angtest_110511.txt

112	0	0	0.00	0.00
113	0	0	0.00	0.00
114	0	0	0.00	0.00
115	0	0	0.00	0.00
116	0	0	0.00	0.00
117	0	0	0.00	0.00
118	0	0	0.00	0.00
119	0	0	0.00	0.00
120	0	0	0.00	0.00
121	0	0	0.00	0.00
122	0	0	0.00	0.00
123	0	0	0.00	0.00
124	0	0	0.00	0.00
125	0	0	0.00	0.00
126	0	0	0.00	0.00
127	0	0	0.00	0.00
128	0	0	0.00	0.00
129	0	0	0.00	0.00
130	0	0	0.00	0.00
131	0	0	0.00	0.00
132	0	0	0.00	0.00
133	0	0	0.00	0.00
134	0	0	0.00	0.00
135	0	0	0.00	0.00
136	0	0	0.00	0.00
137	0	0	0.00	0.00
138	0	0	0.00	0.00
139	0	0	0.00	0.00
140	0	0	0.00	0.00
141	0	0	0.00	0.00

Angtest_111011.txt							
+/-	Beam	Angle	Limit	Max	Outlier	Mean	Diff
	20			0.50		0.00	0.08
	25			0.50		-0.00	0.07
	30			0.50		-0.01	0.07
	35			0.70		-0.02	0.09
	40			0.70		-0.02	0.08
	45			0.70		-0.03	0.09
	50			0.59		-0.04	0.08
	55			0.63		-0.06	0.13
	60			0.50		-0.19	0.11
	65			0.00		0.00	0.00
	70			0.00		0.00	0.00
	75			0.00		0.00	0.00

Beam	Angle	Samples	Max	Outlier	Mean	Diff
1	0	0	0.00		0.00	
2	0	0	0.00		0.00	
3	0	0	0.00		0.00	
4	0	0	0.00		0.00	
5	0	0	0.00		0.00	
6	0	0	0.00		0.00	
7	0	0	0.00		0.00	
8	0	0	0.00		0.00	
9	0	0	0.00		0.00	
10	0	0	0.00		0.00	
11	0	0	0.00		0.00	
12	0	0	0.00		0.00	
13	0	0	0.00		0.00	
14	0	0	0.00		0.00	
15	0	0	0.00		0.00	
16	0	0	0.00		0.00	
17	0	0	0.00		0.00	
18	0	0	0.00		0.00	
19	0	0	0.00		0.00	
20	0	0	0.00		0.00	
21	0	0	0.00		0.00	
22	0	0	0.00		0.00	
23	0	0	0.00		0.00	
24	0	0	0.00		0.00	
25	0	0	0.00		0.00	
26	0	0	0.00		0.00	
27	0	0	0.00		0.00	
28	0	0	0.00		0.00	
29	55	9	0.16		0.08	*
30	56	41	0.63		0.09	*
31	55	46	0.34		0.04	*
32	54	50	0.23		0.06	*
33	53	50	0.59		0.06	*
34	52	46	0.42		0.04	*
35	50	41	0.36		0.05	*
36	49	50	0.24		0.05	*
37	48	36	0.26		0.06	*
38	46	48	0.29		0.05	*
39	45	48	0.23		0.05	*
40	43	50	0.42		0.04	*
41	41	46	0.31		0.06	*
42	40	50	0.40		0.06	*
43	39	50	0.27		0.04	*
44	37	45	0.30		0.04	*
45	35	48	0.23		0.04	*
46	34	46	0.41		0.04	*
47	33	50	0.27		0.03	*
48	31	49	0.20		0.04	*

Angtest_111011.txt					
49	29	48	0.33	0.05	*
50	28	50	0.25	0.04	*
51	27	45	0.39	0.06	*
52	25	45	0.50	0.05	*
53	24	50	0.26	0.06	*
54	22	50	0.48	0.04	*
55	21	50	0.27	0.06	*
56	19	47	0.23	0.06	*
57	18	50	0.28	0.05	*
58	16	49	0.27	0.05	*
59	14	50	0.35	0.05	*
60	13	41	0.24	0.05	*
61	12	50	0.20	0.05	*
62	10	43	0.37	0.06	*
63	9	50	0.88	0.05	*
64	7	50	0.43	0.05	*
65	6	47	0.43	0.05	*
66	4	50	0.50	0.06	*
67	3	42	0.41	0.06	*
68	1	50	0.45	0.06	*
69	0	50	0.56	0.06	*
70	-2	47	0.26	0.07	*
71	-3	50	0.39	0.09	*
72	-5	50	0.30	0.06	*
73	-6	50	0.30	0.05	*
74	-8	50	0.36	0.06	*
75	-10	49	0.27	0.05	*
76	-11	41	0.20	0.05	*
77	-12	50	0.23	0.06	*
78	-14	50	0.27	0.06	*
79	-15	50	0.26	0.05	*
80	-17	50	0.24	0.05	*
81	-19	50	0.37	0.05	*
82	-20	45	0.26	0.05	*
83	-21	50	0.23	0.06	*
84	-23	42	0.32	0.05	*
85	-24	50	0.42	0.06	*
86	-26	50	0.36	0.06	*
87	-27	49	0.42	0.06	*
88	-29	41	0.25	0.07	*
89	-30	45	0.29	0.07	*
90	-32	50	0.31	0.07	*
91	-34	47	0.21	0.06	*
92	-35	50	0.41	0.06	*
93	-36	46	0.67	0.08	*
94	-38	47	0.55	0.08	*
95	-39	49	0.70	0.07	*
96	-41	50	0.26	0.07	*
97	-42	49	0.41	0.07	*
98	-43	49	0.51	0.08	*
99	-45	44	0.49	0.08	*
100	-47	50	0.35	0.08	*
101	-48	50	0.31	0.09	*
102	-50	44	0.48	0.10	**
103	-51	50	0.34	0.12	**
104	-53	38	0.38	0.13	**
105	-54	39	0.45	0.14	**
106	-55	50	0.46	0.17	**
107	-57	50	0.49	0.18	**
108	-58	50	0.50	0.20	***
109	-59	46	0.48	0.18	**
110	-60	48	0.48	0.18	**
111	-61	26	0.39	0.21	***

Angtest_111011.txt

112	0	0	0.00	0.00
113	0	0	0.00	0.00
114	0	0	0.00	0.00
115	0	0	0.00	0.00
116	0	0	0.00	0.00
117	0	0	0.00	0.00
118	0	0	0.00	0.00
119	0	0	0.00	0.00
120	0	0	0.00	0.00
121	0	0	0.00	0.00
122	0	0	0.00	0.00
123	0	0	0.00	0.00
124	0	0	0.00	0.00
125	0	0	0.00	0.00
126	0	0	0.00	0.00
127	0	0	0.00	0.00
128	0	0	0.00	0.00
129	0	0	0.00	0.00
130	0	0	0.00	0.00
131	0	0	0.00	0.00
132	0	0	0.00	0.00
133	0	0	0.00	0.00
134	0	0	0.00	0.00
135	0	0	0.00	0.00
136	0	0	0.00	0.00
137	0	0	0.00	0.00
138	0	0	0.00	0.00
139	0	0	0.00	0.00
140	0	0	0.00	0.00
141	0	0	0.00	0.00